

Experimental result of HPRF September 2008 run and future plan

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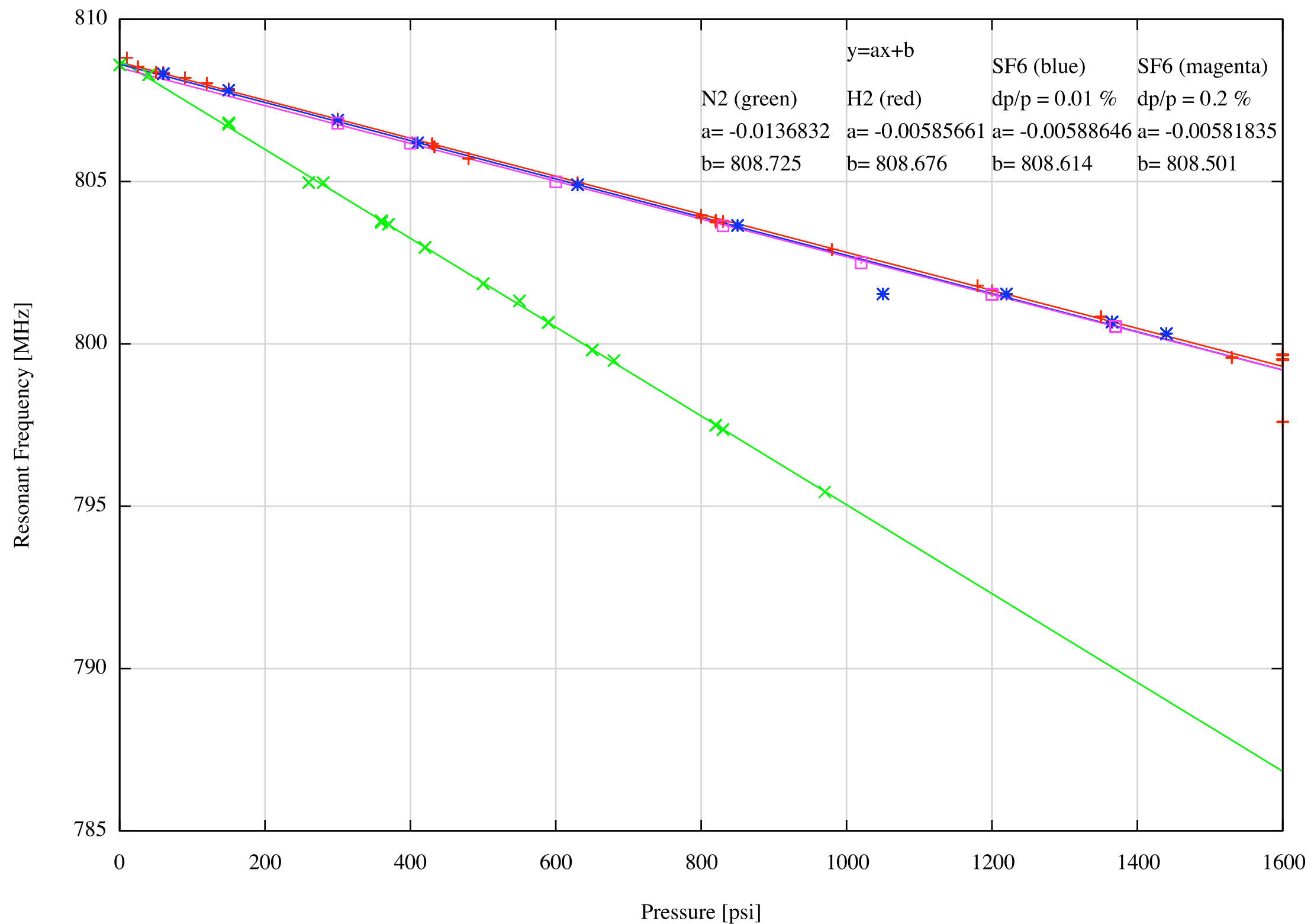
Goal in Sep 2008 run

- How does plateau voltage depend on material?
 - ▶ Focus on melting point: Cu, Al, Sn
- Does dopant gas help to increase recombination rate?
 - ▶ SF₆
- Optical measurement
 - ▶ Measure how does electron grow up arc
- Training people for beam test

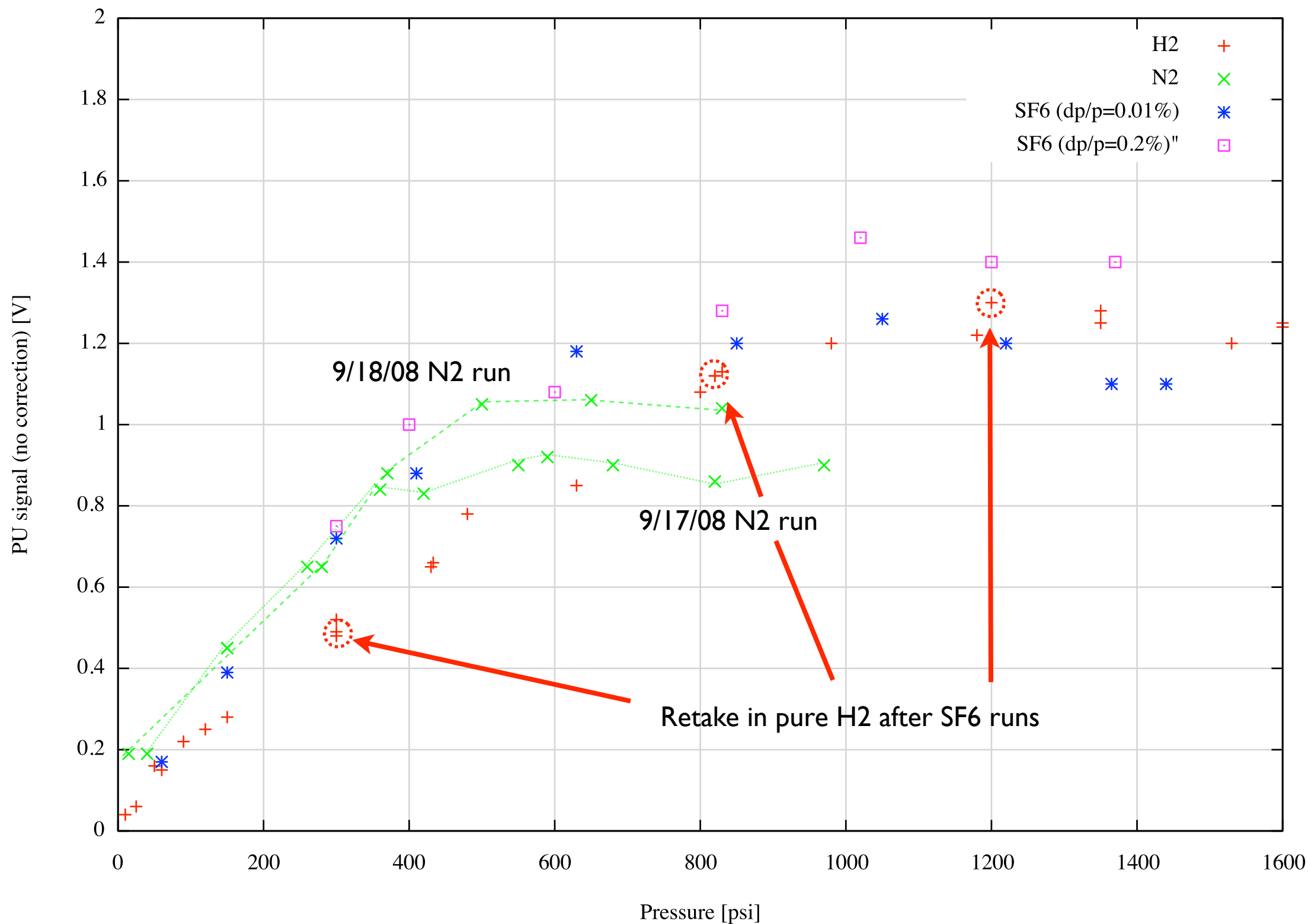
Menu in Sep 2008 run

- N₂ run with Cu electrode
- H₂ run with Cu, Al, Sn electrodes
- SF₆ run with Cu, Al, Sn electrodes
- He run with Sn electrodes
- Primitive optical measurement
- Flat top time dependence
- Repetition rate dependence

Frequency vs Gas Pressure



Cu run



MCTF meeting

Bottom Cu electrode



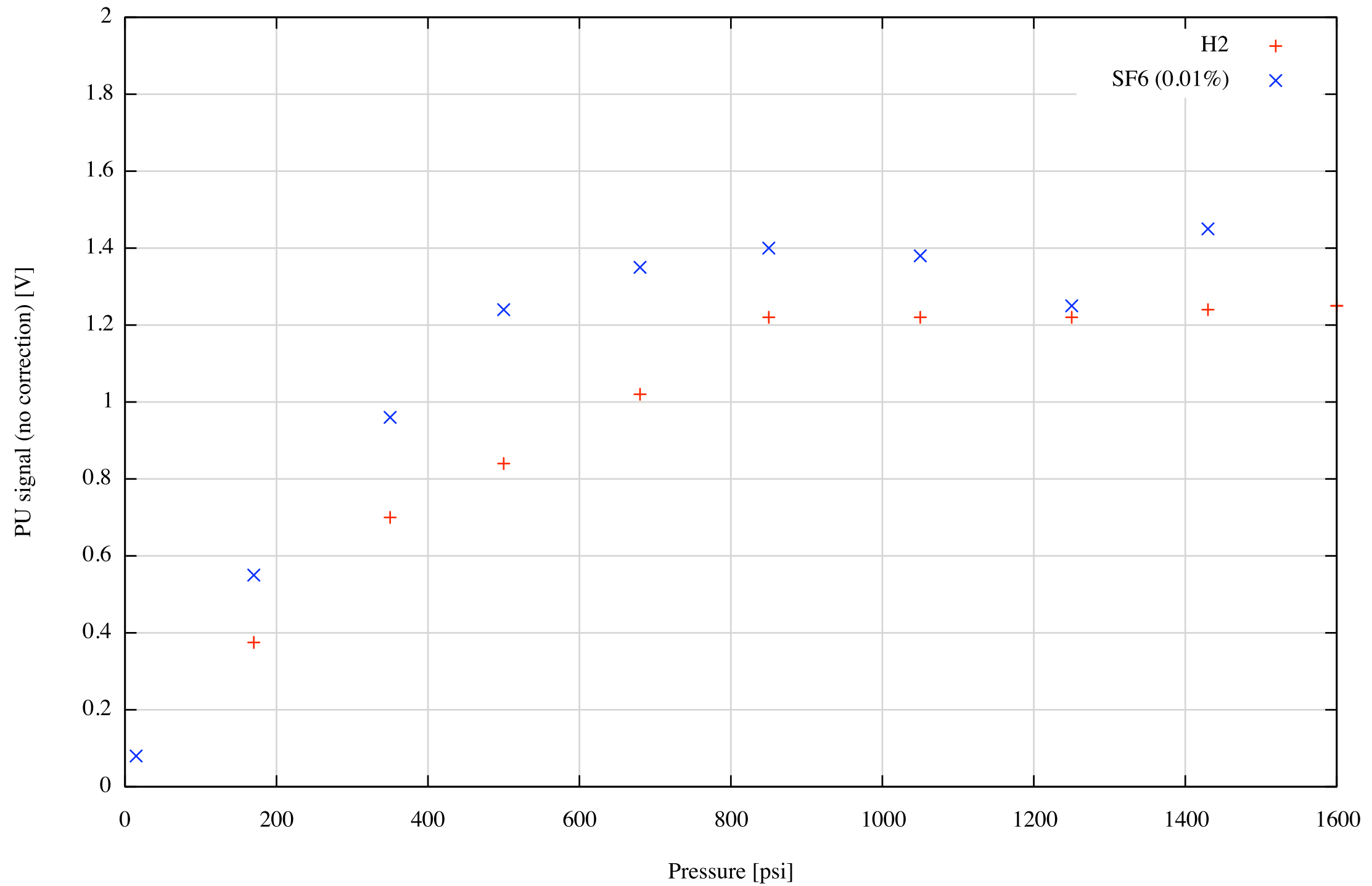
Top Cu electrode



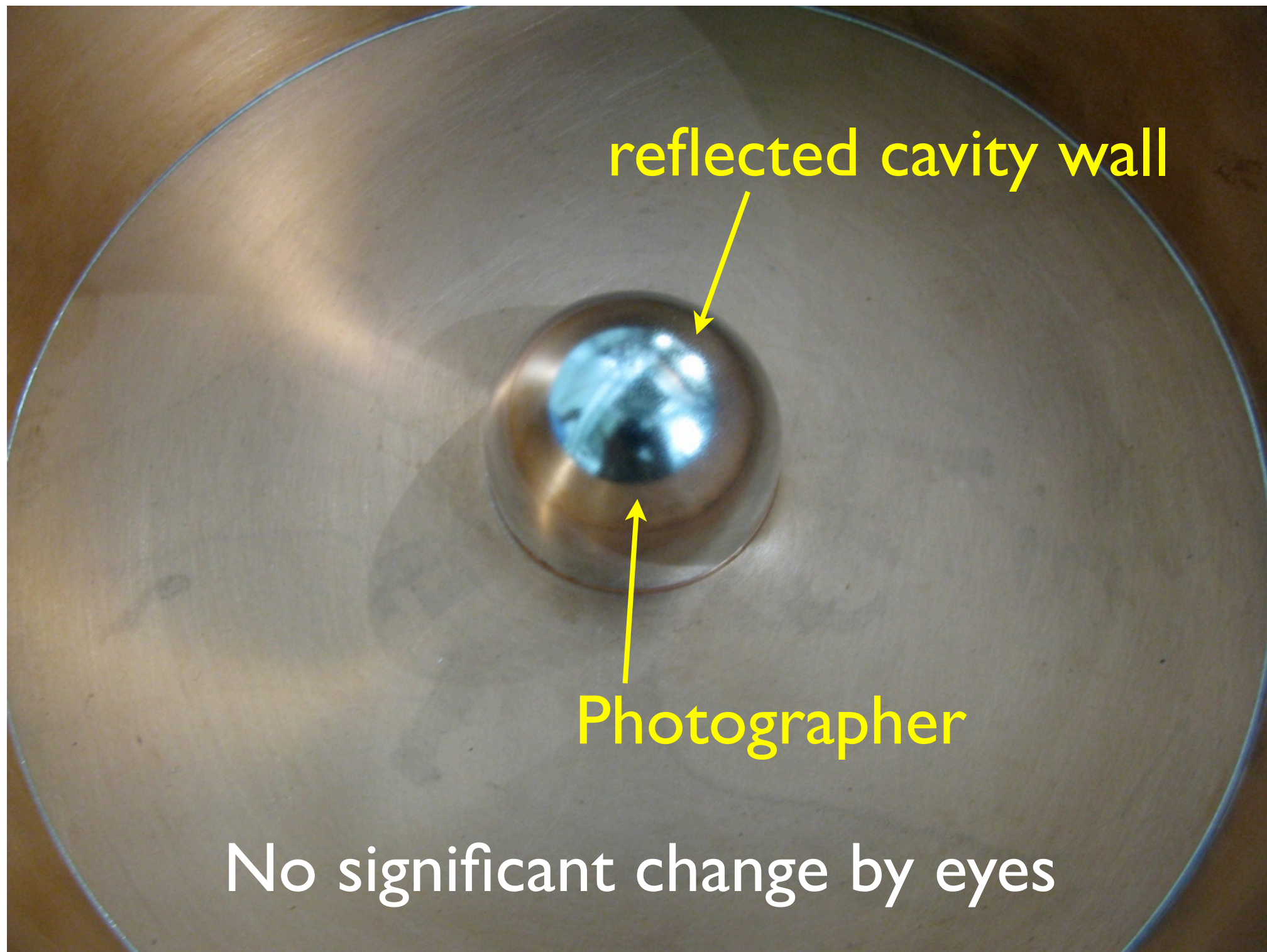
Different spot sizes:
Top electrode has larger spot size for all material runs

Al run

Al test (Sep 2008 run)



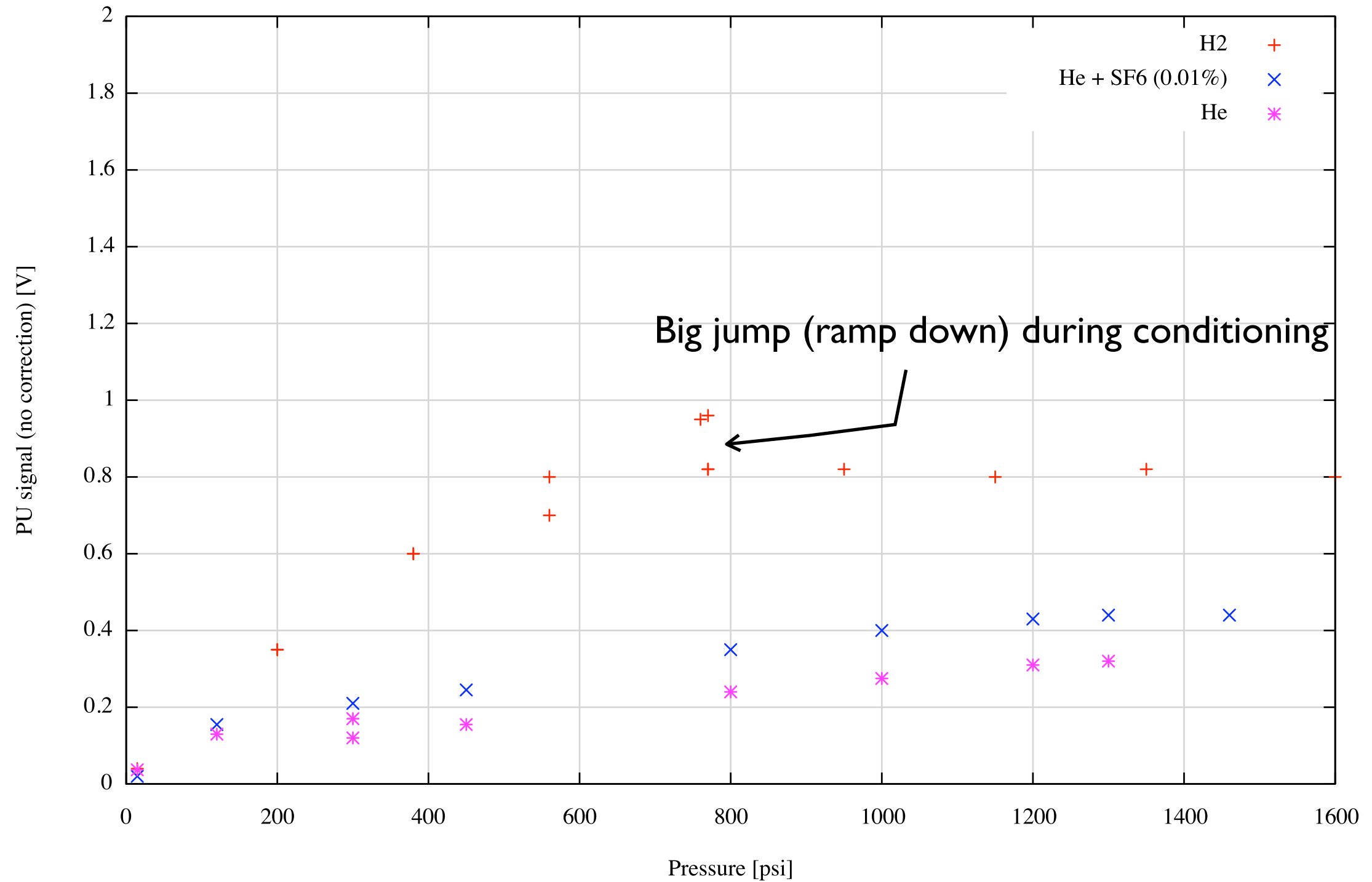
Al electrode



No significant change by eyes

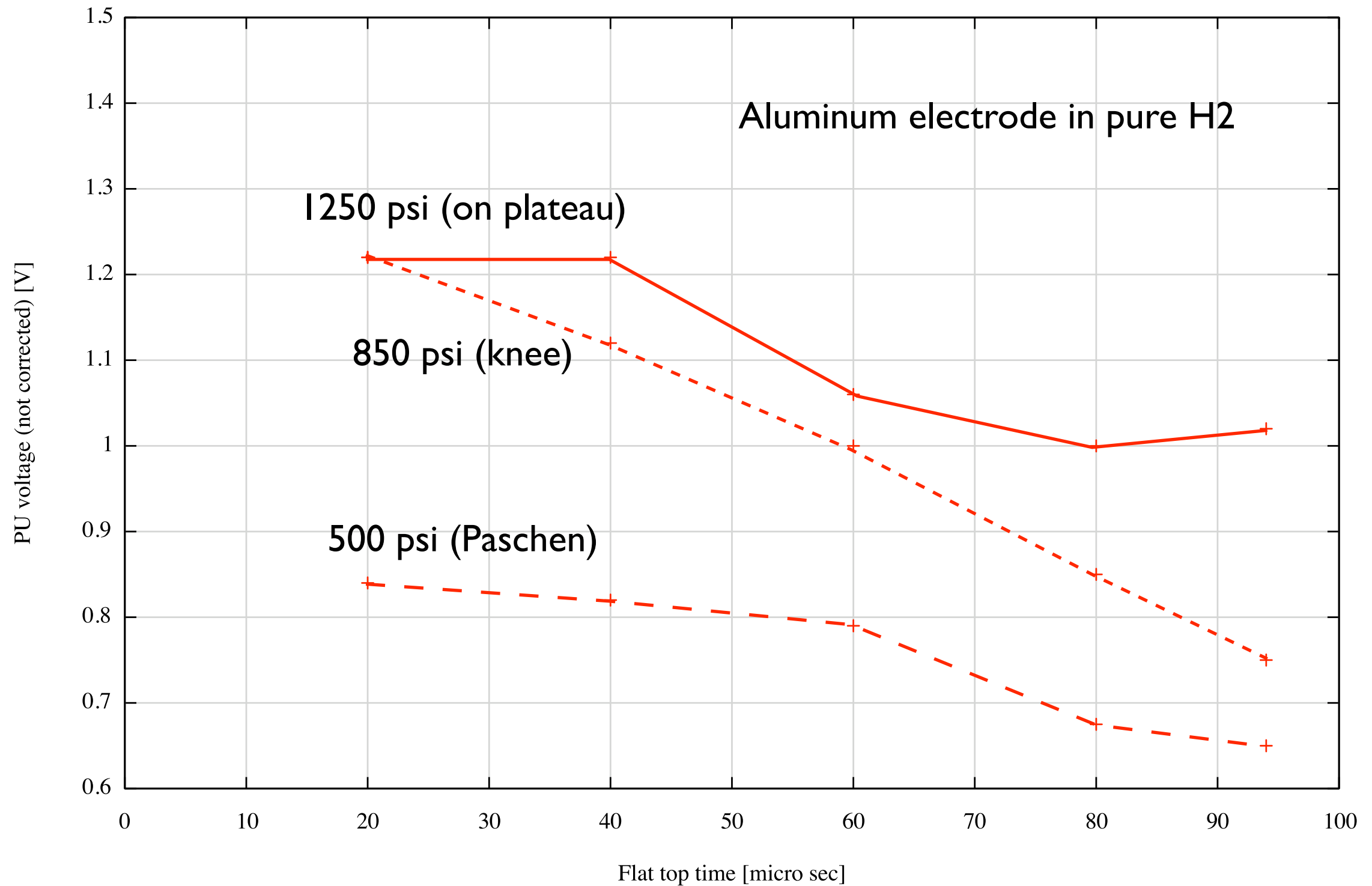
Sn run

Sn test (Sep 2008 run)



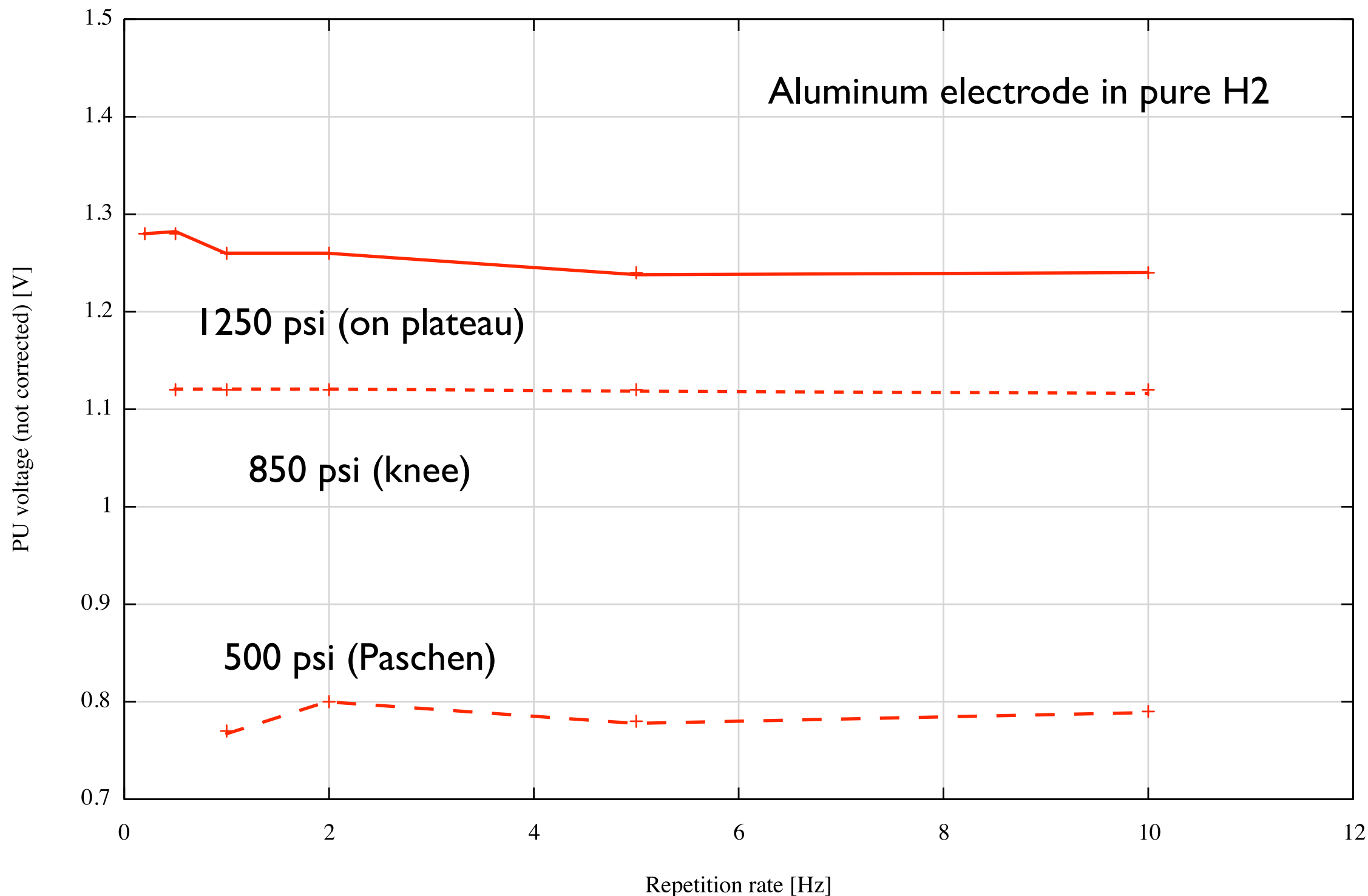
Flattop time dependence

Flat top time (Sep 2008 run)



Repetition rate dependence

Repetition rate (Sep 2008 run)



Analysis of rep rate dependence

by Mike Neubauer

Breakdown of Al electrodes in H2 as a function of time between pulses

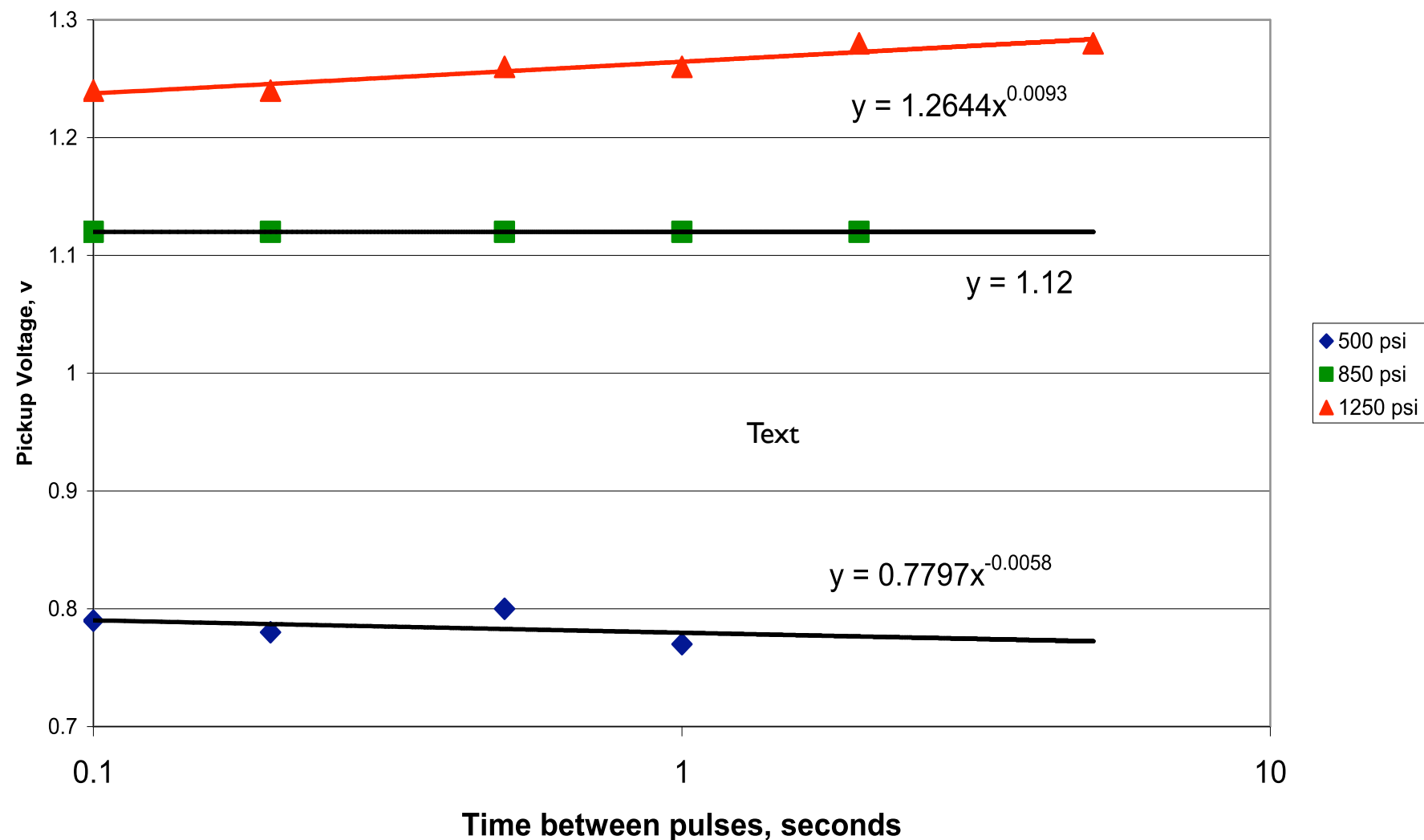
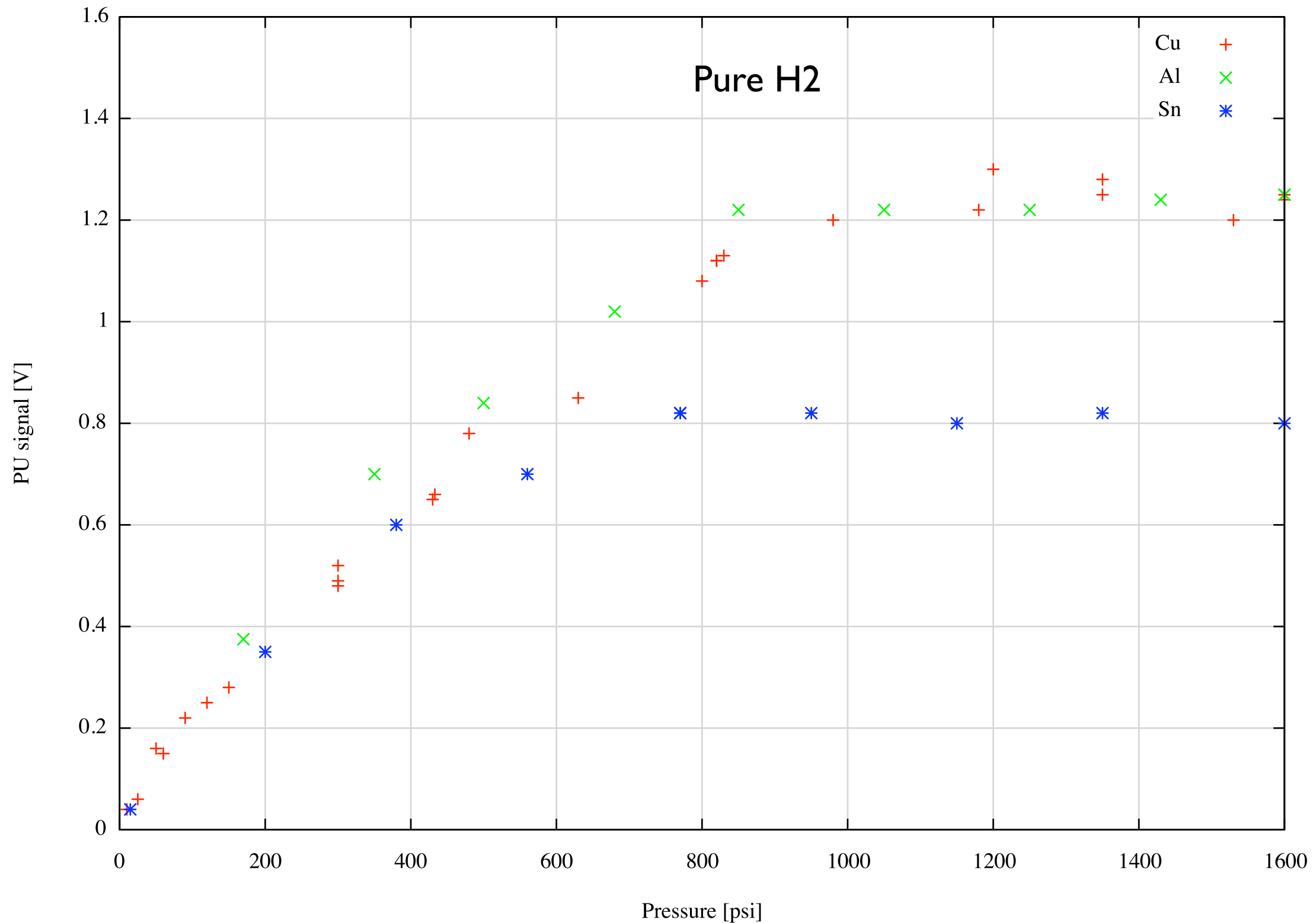
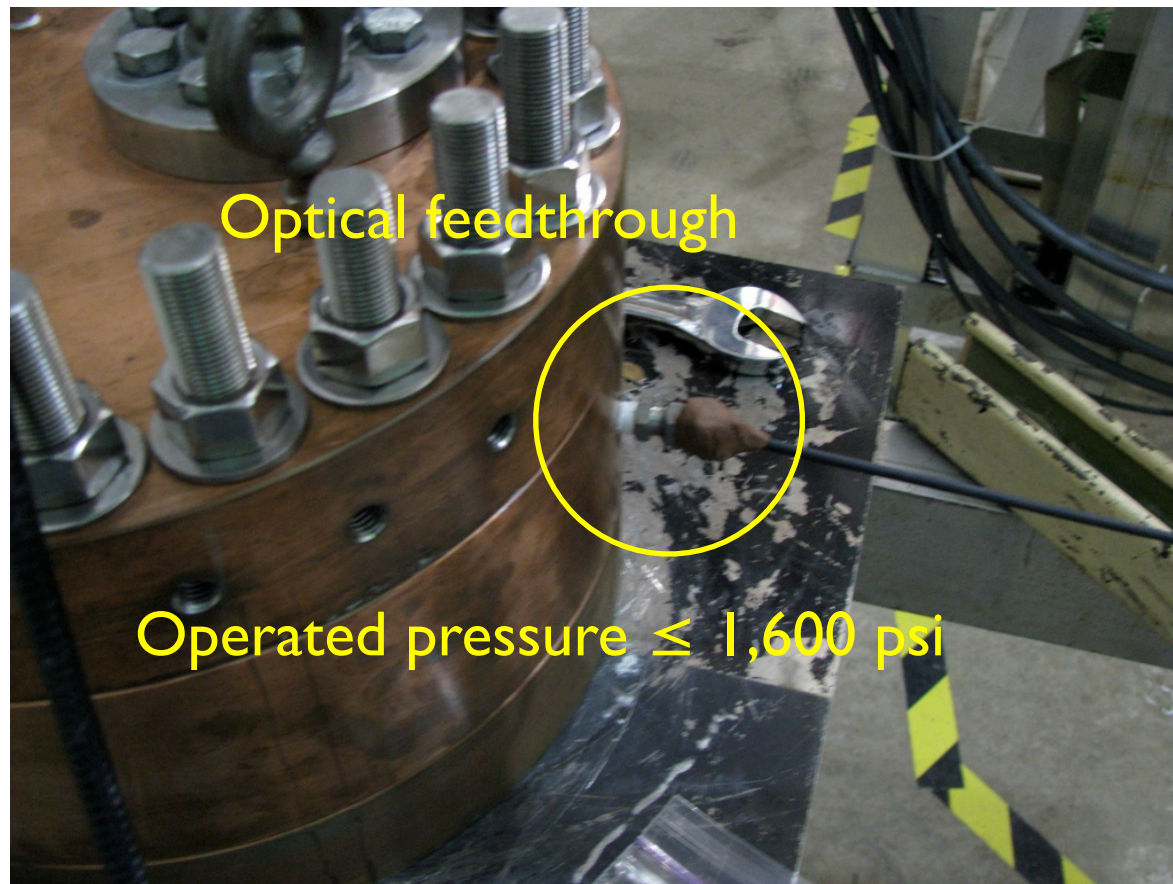


Figure 6. Breakdown of Al electrodes in H2 as a function of time between pulses. The most pronounced effect is in the region of highest gas pressures. Curiously, the slope of the data seems to change from a negative curve in the pure gaseous breakdown at low pressures, to a positive slope in the high pressure surface dominated region. More data points will be very interesting and perhaps identify the most important aspects of the gas to improve the breakdown limits.

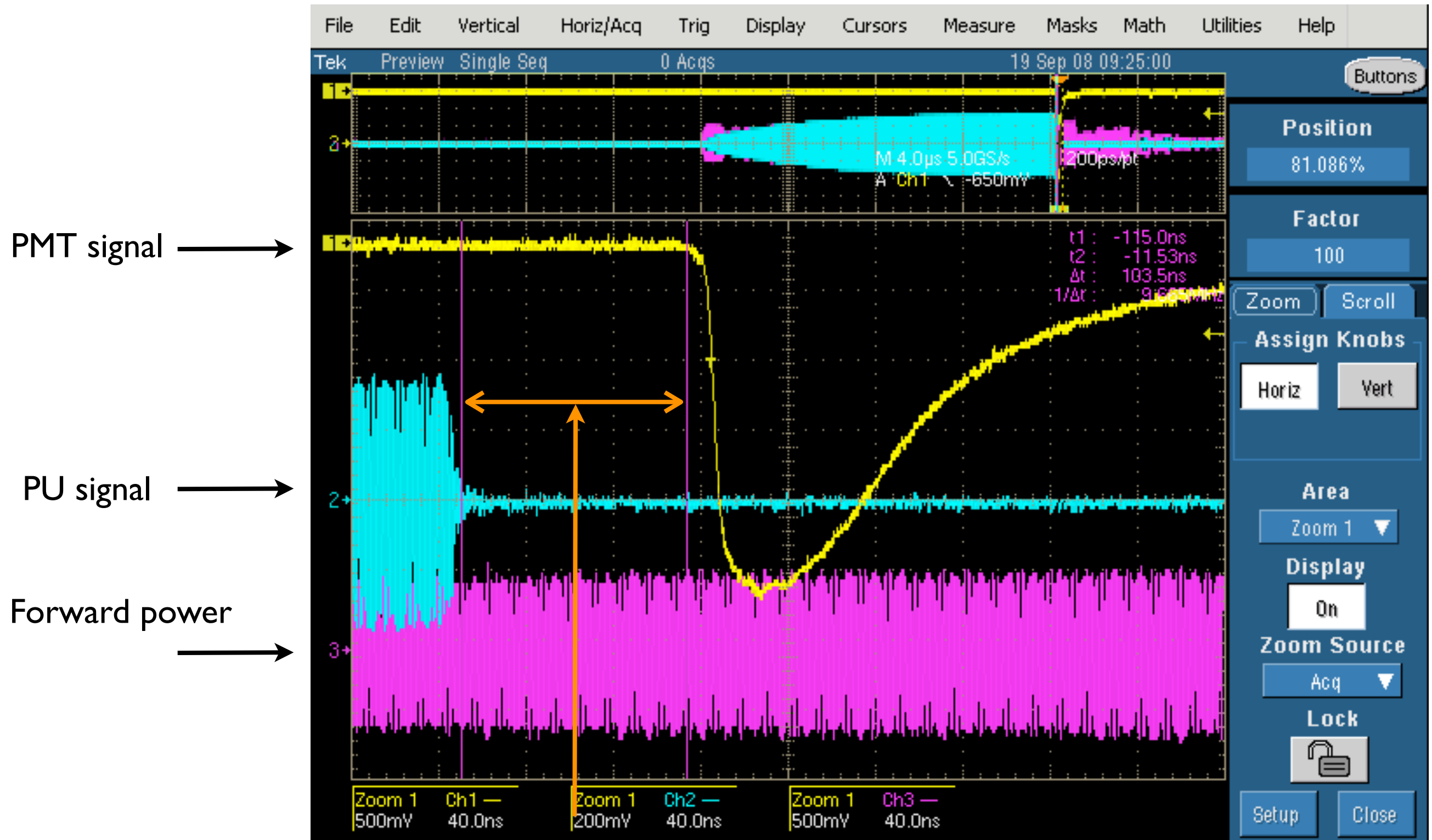
Breakdown voltage in various electrodes



Optical measurement



Typical optical signal



Optical signal is delayed by cable + optical device
Timing calibration is required

More analysis

- Timing calibration
- Solid angle test
- Decay rate
- Rise time and decay rate for small spikes that often take places after a big breakdown signal
- Rise time and decay rate of PU voltage



Future test

- Develop optical measurement
 - ▶ Spectroscopy
 - ▶ Imaging
- Thermal measurement
- Acoustic measurement
- (Test more electrode material)
- Beam test

Summary

- Observed RF breakdown in various conditions
 - SEM microscopic analysis will be done soon
- Still analyze optical signal
 - Need fine timing calibration
- Very successful test